

REMARKS

Upon entry of the present amendment, claims 1-9 will remain pending in the above-identified application and stand ready for further action on the merits.

In the instant amendment, claims 1-9 have been amended.

The amendments made herein to the claims do not incorporate new matter into the application as originally filed.

Accordingly, proper consideration of each of the pending claims (i.e., claims 1-9) is respectfully requested at present, as is entry of the present amendment.

Claim Objections

At page 2 of the outstanding Office Action, claims 1 and 7-9 have been objected to based upon informalities therein.

In the present reply, claims 1 and 7-9 have been amended so as to remove the informalities pointed out by the Examiner.

Accordingly, Applicants respectfully request that this objection be withdrawn.

Claim Rejections under 35 USC § 102 and § 103

At page 3 of the outstanding Office Action, claims 1-2 and 5-9 have been rejected under 35 USC § 102(b) as being anticipated by Maeda EP '778 (EP 927778). At pages 4-6 of the outstanding Office Action, claims 3-5 have been rejected under 35 USC § 103 (a) as being unpatentable over Maeda EP '778, and further claims 1-3 and 5-8 have been rejected under 35

USC § 103 (a) as being unpatentable over JP '551 (JP 07-249551) in view of Morimoto US '926 (US 4,725,926). Applicants respectfully traverse.

Reconsideration and withdraw of each of these rejections is respectfully requested based on the following considerations.

Present Invention and Its Advantages

The present invention is directed to an electrical double-layer capacitor. More specifically, the capacitor of the present invention has polarizable electrodes containing as a main component an activated carbon having micropores with a pore radius distribution peak as determined by an MP method within a range of 4.0×10^{-10} to 8.0×10^{-10} m, and a liquid electrolyte containing an electrolyte salt which is an ionic liquid being a quaternary ammonium salt.

As shown in Examples of the present specification (see page 15-22 of the specification), the capacitor of the present invention has excellent charge-discharge characteristics at a low temperature and low internal impedance at a low temperature.

Distinctions over Maeda EP '778

First, Maeda EP '778 fails to disclose or suggest "an activated carbon having micropores with a pore radius distribution peak as determined by an MP method within a range of 4.0×10^{-10} to 8.0×10^{-10} m," which is one of features of the present invention, as recited in claim 1.

Maeda EP '778 merely discloses a capacitor which has an electrode containing a mesophase pitch-based activated carbon fiber having micropores with a pore radius distribution

as determined by an MP method within a range of 4.0×10^{-10} to 15×10^{-10} m, and has an electrolyte composed of a quaternary ammonium cation and an anion such as BF_4 .

However, Maeda EP '778 is silent about using an activated carbon having micropores with a pore radius distribution peak as determined by the MP method within a specific range of 4.0×10^{-10} to 8.0×10^{-10} m.

Thus, Maeda EP '778 fails to disclose or specifically suggest the activated carbon having micropores with such a specific pore radius.

Next, Maeda EP '778 fails to disclose or suggest "a quaternary ammonium electrolyte salt which is an ionic liquid" which is also one of features of the present invention, as recited in claim 1.

Maeda EP '778 merely discloses TEABF_4 as a quaternary ammonium salt. TEABF_4 (CAS No. 429-06-1, white powder, decomp. at 370°C) is in a solid state at a relatively high temperature.

Therefore, Maeda EP '778 is silent about using a quaternary ammonium-type ionic liquid as an electrolyte.

Furthermore, Maeda EP '778 does not give any motivation to use a quaternary ammonium-type ionic liquid as an electrolyte in combination with the activated carbon in capacitors.

Further, Maeda EP '778 also fails to disclose or suggest the ionic liquid having general formulas (1) and (2), as an electrolyte in capacitors, as recited in present claims 3 and 4, respectively.

Accordingly, the present invention is not anticipated by Maeda EP '778, and Maeda EP '778 does not give any motivation to arrive at the present invention.

Distinctions over JP '551

JP'551 also fails to disclose or suggest that feature of the present invention (e.g., the electrolyte of the inventive capacitor is a quaternary ammonium-type ionic liquid).

Thus, JP'551 does not give any motivation to arrive at the present invention.

Distinctions over Morimoto US '926

Morimoto US '926 discloses a capacitor having an electrolyte solution in which contains a quaternary phosphonium salt.

However, Morimoto US '926 fails to disclose or suggest that the electrolyte is a quaternary ammonium-type ionic liquid, which is a feature of the present invention.

Thus, Morimoto US '926 does not give any motivation to arrive at the present invention.

Combination of the Cited References

A *prima facie* case of obviousness is not established even if the cited references are combined since none of the cited references disclose or suggest the features of the present invention (e.g. the specific activated carbon with a specific pore radius and the liquid electrolyte containing the quaternary ammonium-type ionic liquid,), which is recited in claim 1. Likewise, it follows that a person having ordinary skill in the art would not be motivated by any of the teachings of the cited references to arrive at the present invention.

Accordingly, the cited art does not provide any motivation to arrive at the instant invention as claimed.

Unexpected Results

As mentioned above, the present invention produces unexpected results. Namely, the capacitor of the present invention, by using the electrode containing the activated carbon having micropores with such a specific pore radius and the ionic liquid electrolyte, has excellent charge-discharge characteristics at low temperatures and low internal impedance at low temperatures.

Specifically, as shown in the Examples of the present specification, by using electrodes containing the activated carbon having micropores with a pore radius distribution peak within a range of 4.5×10^{-10} to 7.0×10^{-10} m in combination with the ionic liquid, which is represented by, for example, general formulae (1) and (2), the capacitor of the present invention shows good retention of the capacitance at -40°C .

Such advantageous results are not suggested by any of the cited references.

Accordingly, the present invention (independent claim 1 and claims dependent therefrom) is neither anticipated by nor obvious over the cited references.

CONCLUSION


Based upon the amendments and remarks presented herein, the Examiner is respectfully requested to issue a Notice of Allowance clearly indicating that each of the pending claims 1-9 are allowed under the provisions of Title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Gerald M. Murphy, Jr. (Reg. No. 28,977) at the telephone number below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,


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